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10/827,457	04/19/2004	Shinji Maekawa	0553-0408	2984

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/827,457	MAEKAWA ET AL.
	Examiner	Art Unit
	MARIANNE L. PADGETT	1715

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/21/10 & 10/26/10*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,16,17 and 23-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,16,17 and 23-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/26/10*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

1. A **Request for Continued Examination** under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's **submission** filed on 9/21/10 has been entered.

It is noted that applicants' amendments to the claims have altered the scope of the various independent claims, however the generic teachings of Kiguchi et al. with respect to pre-and post treatments when performing droplet pattern deposition, inclusive of plasma treatments &/or affinity treatments remain relevant to these modified claims, especially in combination with secondary references, for reasons as set forth below.

2. Applicants' IDS of 10/26/10 is made of record, with it noted that the two cited US patents to **Kiguchi et al**. (6,877,853 B2 & 7,114,802 B2) are continuing & divisional children of **Kiguchi et al.** (6,599,582 B2) already of record & previously applied & discussed with respect to previously presented claims, while similarly JP 11-204529 A is the Japanese patent from Kiguchi et al. (582)'s priority document & EP 0930641 A2 is the EPO version from the same patent family. It's further noted that the PGPub 2003/0003231 A1 is also a member of the same patent family, is in English & is a statutory bar.

Okada et al. (6,893,103 B2 ≡ 2002/0054197 A1 ≡ JP 2002-196127 A), while of interest for employing a plurality of nozzles to deposited functional liquids for making various patterned device structures & employing plasma etching (dry etching) to improve affinity for functional liquid to be deposited thereon ((197): [0067]), applies the plasma treatment to the electrically insulating glass substrate into areas between partitions 14 (e.g. organic photoresist upper layer 17+ metal light blocking layer 16), for the particular example of the functional liquid being an ink for creating coloring layers in pixels. It is noted EP 1238708 A1 has to priority document is one of which is that of the above Okada et

al. references & it is noted that these references have overlapping teachings with previously cited **Okada et al**. (2002/0014470 A1).

3. **Claims 1, 3-4, 6, 23-29 & 31-32** are rejected under 35 U.S.C. **112, second** paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In independent **claim 1**, applicants have deleted limitations with respect to the "liquid repellent" properties of the "thin film" that is formed & the "electrically insulating" property of the surface on which it is formed, as were previously recited in lines 2-3 & 6; however in lines 7-8 the process limitations still refer to "the liquid-repellent thin film" & "the liquid composition", which no longer have any proper antecedent basis, as it was deliberately deleted. Therefore, it is unclear for the claims as amended whether or not the limitations with respect to the thin film being "liquid-repellent" before plasma treatment are required or not. For purposes of examination either option will be considered relevant to the claims as ambiguously written. Furthermore, the amendment of line 11 removes the article showing antecedent basis, thus line 11 is now reciting "a liquid composition...", so it is unclear in its relationship to the previously recited "the liquid composition" of line 8, hence it is unclear whether or not the same compositions are necessarily being referred to or required, & it is not necessarily clear how the plasma irradiation of the selected portion of the thin film affects the claimed applying of "a liquid composition" thereto.

In independent **claim 23**, the only place the "liquid composition having electrical conductivity" is necessarily applied is to "the selected portion", which is also the only place that the "resist composition" which forms the "mask pattern" is necessarily applied, thus while neither the liquid composition nor the resist composition are explicitly limited to being only in the selected portion, thus likewise for the resultant conductive film & mask pattern, but neither are either one necessarily anywhere outside the selected portion. Therefore, it is unclear what, if anything, is etched by the requirement of "etching the

conductive film selectively according to the mask pattern to form a conductor be patterned by plasma etching", as there is <u>no clear indication of anything capable of being etched</u>, since there need be no portions of the formed "conductive film" not covered by the mask, i.e. nothing need be available to etch! This claim language may be considered to be literally **self-contradictory**. Note given the actual claim requirements as noted above, the claim might be considered to encompass a conductive patterned having been formed before any plasma etching occurs, with it unclear how or if the final conductive pattern actually differs from the initial conductive patterned due to the lack of any thing clearly exposed to possible etching. While the examiner assumes applicants' intent is for claim 23 & its dependent claims to read on a process, such as illustrated in figures 8A-D, these claims as written while <u>possibly</u> encompassing such a procedure if one considers conductive film forming where no liquid composition was required to be deposited & no mask pattern forming thereover (i.e. if one reads limitations into the claim which are not actually present); <u>however</u> these claims are <u>**not** limited</u> thereto, since the configuration of the illustrated conductive film 11 & mask pattern 14 is <u>not required</u> by the claimed process, which as written does **not** actually provide any portion of the conductive film to be exposed such that it may be etch it; therefore it is unclear whether or not anything is actually necessarily etched or if it is possible to perform etching in the scope claimed. <u>Independent **claim 26** has analogous clarity issues</u> to those of claim 23.

Claim 31 requires that "the etching has performed by locally discharging plasma from plural plasma discharge ports"; however independent claim 23 from which claim 31 depends has been amended to require "a quantity of gas sprayed by an array of nozzles for the plasma etching", however it is unclear what relationship the "ports" of claim 31 have to the nozzles of the independent claim, especially considering that as claimed the gas being sprayed has not necessarily been turned into plasma.

4. With respect to **scope**, the examiner notes that the amendment to **claims 2 & 26** have been amended to etch an upper part of a thin film deposited on a electrically insulating surfaces of a

substrate in order to modify the surface topography by formation of a groove, a hole or surface roughening, however reciting etching an upper part of a film does not exclude etching through the entire thickness of the film, as etching through will still be etch the upper part & modify the surface topography. Applicants cite figures 2A-D as support (as well as inappropriately citing [0042] of the PGPub that is not part of the scanned filed), which figures show a substrate with <u>no films deposited thereon</u>, discussion of which may be found on page 8, line 15-page 9, line 15, and calls the illustrated substrate labeled as a ref.#200, "thin film 200", but does **not** discuss any coating as required in the claims. Page 8, lines 20-24 indicate that the size of the groove may be adjusted to be suitable size for housing the drop that is to be discharged, or the sentence bridging pages 8-9 states that "surface asperity may be changed to improve the contact property of a discharged composition". <u>However</u>, none of these teachings are applied to a thin film that has been deposited on in electrically insulating surfaces, nor does this teaching provide for not totally etching through such an applied film when forming a groove or hole, as discussed by applicant on page 10 of the 9/21/2010 response; but since the claims are not actually limited to the scope discussed by applicants (i.e. not totally etching through a deposited thin film in the vertical direction), their arguments that this is a required scope distinguishing over the prior art are <u>not convincing</u>. It is noted that the claims as written certainly may encompass the meaning discussed by applicants, but there is need for the examiner to consider if this encompassed & not properly disclosed scope includes New Matter.

5. **Claims 1-6, 16-17 & 23-32** are rejected under 35 U.S.C. **112, first** paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

As noted above in section 4, with respect to independent **claims 2 & 26**, no clear support was found for the scope of the amended claim language, especially the option applicants argue as the intended meaning of the amendment, where a layer (e.g. thin film on an electrically insulating substrate) has a hole

or groove only partially penetrating the thickness of a layer on the substrate, was not seen to be supported by the teachings as illustrated in **figure 2** & discussed on **pages 8-9** (presumably [0042] of the PGPub), which only supports not making the groove all the way through an entire substrate (called a thin film, but is not in the same sense employed in the claims, thus does not provide support for the meaning discussed by applicants on page 10 of their 9/21/10 response). Therefore, lacking a clear showing of support for all options encompassed by the amended claim language, these claims now encompass **New Matter**.

With respect to the amendments to independent **claims 1 & 23**, amended claim 1 recites "... plasma etching using gas sprayed by an array of nozzles, using the pattern as mask; wherein a quantity of gas sprayed varies according to the pattern" (lines 16-18), with analogous language added in claim 23. On page 10 of the 9/21/2010 response, applicants cite **figure 10B** as support where the examiner notes that it is discussed on **page 22**, lines 17-25 of the original specification, which teachings are not the same in meaning as the amended claim language. Specifically, this paragraph states twice "In the etching, **plasma** fluoride gas is irradiated from nozzle units 31" (emphasis added), thus it is not **merely** gas which is sprayed by the nozzles as claimed, but gas that has already been turned into a plasma; hence these claims encompass **New Matter**, as they read on spraying the gas from the claimed array of nozzles, then turning it into a plasma, as well as the possibility that the gas sprayed from the nozzles is already in plasma form.

It is noted that disclosure on page 22 further teaches with respect to the plasma fluoride gas: "in this case, the quantity of the reactive gas to be sprayed is varied between the vicinity of the wiring forming region and the other region...", where the examiner notes that drain wiring 30 & source wiring 29 are being employed as a mask for etching both non-single crystal silicon films 27 & 20, with figure 9D illustrating deposition of film 27 & figure 10A discussed in paragraph bridging pages 21-22 discussing improving contact property by plasma processing, then applying the conductive paste for the wirings. Thus, this specific teaching does provide the generic configuration of deposition sequences, except for the

unclear claim references with respect to ambiguous liquid-repellent properties of the thin film as deposited, however it is only taught for a specific structure formation. Furthermore, the examiner notes that the "... spray is varied between..." is not specific with respect to exactly how the quantity of gas is varied, but is spraying plasma fluoride gas in both named regions, but in different quantities in the two regions; or is spraying only in one region & not in the other, so while the regions can be said to reasonably relate to the claimed "pattern", the original specification's teachings do not encompass unlimited variations in the spraying of gas (before or after it becomes plasma) with respect to "the pattern" or to specified regions as is presently claimed, thus this aspect of amended **claims 1 & 23** also encompasses some **New Matter**.

6. The following is a quotation of **35 U.S.C. 103(a)** which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The **nonstatutory double patenting rejection** is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., In re Berg, 140 F.3d 1428, 46 USPQ2d 1226

(Fed. Cir. 1998); In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. It is noted that **Kiguchi et al.** (6,599,582 B2 or 2003/0003231 A1) provide equivalent teachings, however all citations in the following rejections are with respect to the (582) patent, but the same teachings may be found in the corresponding paragraphs in the (231) PGPub.

8. **Claims 2, 5, 16-17 & 30** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Kiguchi et al.** (6,599,582 B2 or 2003/0003231 A1), in view of **Di Dio** (2004/0152329 A1) <u>or</u> **Okada et al**. (2002/0014470 A1), plus **Speakman et al**. (6,849,308 B1), <u>optionally</u> this thing further considering **Lewis et al**. (5,272,979).

Kiguchi et al. ((582) or (231) teach at various treatment systems employed with inkjet drop delivery to substrates (useful nozzle system described) of coating materials, inclusive of <u>essentially any fluid of sufficiently low viscosity</u>, hydrophilic or hydrophobic, exemplified by compositions containing electric conductive metal & solvent, metal salts, organic pigments in resins & Al_2O_3 or silica. While the substrates on which the processes may be performed are not particularly limited, specific mention is made of substrates used in semiconductor processes or integrated circuits, such as silicon substrates, or substrates on which plasma treatment has been performed resulting in <u>crosslinking of macromolecules</u> of the substrate, i.e. essentially disclosing polymeric substrates that are inclusive of <u>insulating materials</u> (e.g. col. 1, lines 7-23; & col. 11, lines 33-48, etc.). Kiguchi et al. described employing a drive mechanism 4 to move the **<u>inkjet head & treatment apparatus in tandem</u>** in either X- or Y-directions, as illustrated in figures 1-6, esp. 1-3, which reads on claimed horizontal movement, consistent with patterning due to

successive or sequential deposits with treatments, i.e. generally consecutively or repeatedly performing taught & claimed procedures. Kiguchi et al. have disclosures relating to **treatments** performed **before**, during and **after droplet delivery**, where the treatments delivered before are of particular interest with respect applicants' claims of modified topography, as it is taught that the substrate can be surface modified to achieve affinity for the fluid before this fluid has been ejected onto the substrate (col. 10, lines 28-44, etc.). These pre-treatment techniques are inclusive of "reverse sputtering" in Ar (i.e. generally a plasma etching effect, inclusive of roughening), corona ejection treatments & gas plasma treatments, with description of performing a plasma treatment discussing the treatment apparatus being configured such that is possible to eject a plasma generated by a gas discharge, which ejection teachings are considered to read on the equivalent to a nozzle configuration.

Alternatively, it would've been obvious to one of ordinary skill in the art that in order to effect ejection of plasma or corona discharge, it would've been necessary to have a chamber or generation zone with an exit to eject them from, thus to employ such a structure in order to perform the teachings of Kiguchi et al. The reference specifically teaches use of plasma type processes (sputtering, corona or plasma treatment) for use in pretreatment of surfaces before application of ejected droplets, and particularly mentions that surface modifications employed may be used to create affinity for the liquid being applied in the desired path, remove affinity for the liquid to be applied on banks adjacent to the desired deposition path **&/or** to actually form banks around the pattern forming region in order to prevent fluid from flowing out of it (e.g. col. 3, lines 22-53, esp. 40-44, etc.). Kiguchi et al. further disclose that their disclosed treatment options may be used individually or a plurality of them may be used at the same time when pattern formation is completed as a result of the plurality of steps. Particularly see the abstract; figures; col. 1, lines 8-16 & 48-65; col. 2, lines 8-13; col. 3, lines 23 (esp. 40-45 for bank formation)-col. 4, line 14 & 40-42 & 57-64; col. 6, lines 15-45+; col. 7, lines 11-45; col. 8, lines 1-12; col. 9, lines 52-55; col. 10, lines 1-4; embodiment 3, esp. col. 10, lines 28-44 & 51-col. 11, lines 7, 33-41 &

53-59; plus further relevant disclosure on col. 12, lines 10-25; col. 13, lines 1-10 suggesting various polymers or resins as bank material; & col. 18, lines 17-52; plus claims. Note that the taught use of "**reverse sputtering**" in Ar, while not specifically discussing roughening, would have reasonably been understood by one of ordinary skill in the art to mean Ar plasma removing material from the surface being treated via sputtering, i.e. etching, which as the sputtering is done in order to provide the taught improved affinity for the surface on which liquid drop deposition is to be performed, would reasonably have been expected to have caused roughening or alternatively it would've been further obvious to one of ordinary skill in the art that such sputter etching to improve affinity has been employed to cause its conventional & typical effect of removing surface materials to effect a roughened texture with increased wettability (i.e. affinity) or to remove contaminants.

As previously discussed, the claims require an integrated structure of first & second nozzles employed for liquid droplet deposition & plasma treatment respectively, with clear statements on the record with respect to intended scope (3/18/2010 remarks). With respect to their integrated nozzle structure, applicants have previously argued that Kiguchi et al. (582) do not provide teachings of the claimed integrated structure used in processing & argued that the block diagrams 1-7 show inkjet system separated from treatment means, however the examiner noted that while the block diagrams show them as separate blocks, they also illustrate the blocks as moving in tandem, with it specifically noted that figure 1 illustrates inkjet print head (2) & treatment means (3) as employed together with dashed lines of a box surrounding these two means, which are both moved by what is indicated to be one "drive mechanism 4" (col. 6, lines 15-25). Hence, While there is no explicit teaching of "integration" of ink jet head & treatment means, Kiguchi et al. (582) is considered suggestive thereof, especially in view of **Speakman et al**. (abstract; figures, esp. 5, 7-8, 10-11, 13, 15, 16-22, 24; col. 3, lines 3-49 & col. 4, lines 11-20 & 31-39+; col. 5, lines 46-67, esp. 64-67; col. 6, lines 10-15+; col. 7, lines 59-65; col. 9, lines 36-53; col. 17, lines 56-60 & col. 18, lines 12-39; claims, esp.1, 19-20, 29, 37-38 & 67), who teach an integrated

printhead electromagnetic radiation treatment structure, which teaching is generic to radiation treatments in general, thus inclusive of plasma, although Speakman et al.'s specific preferred electromagnetic radiation employ various light or microwave radiation techniques, however they also teach in-situ plasma pretreatment, as well as mentioning employing pulsed plasma electrode configurations for pretreatment adjacent to the droplet landing zone. Therefore, considering Kiguchi et al., including as combined with Di Dio &/or Lewis et al., as discussed below, it would been obvious to one of ordinary skill in the art that given the suggestive disclosure of Kiguchi et al. with respect coupling of inkjet printers & per- or post-treatment radiation techniques, plus the teachings of Speakman et al. explicitly integrating inkjet print heads & radiation treatment means used for analogous processing, to employ **integrated plasma & inkjet nozzles** as claimed, particularly considering that the combined references clearly show the capabilities of localized plasma treatments analogous to localized radiation treatments of Speakman et al.

It was previously noted that while Kiguchi et al. discuss pattern formation, illustrating in figure 1, a pattern path moved in several different horizontal directions, they do not explicitly discuss deposition of multiple pattern portions when employing pretreatment using some form of plasma, however given the teachings of arbitrary patterning (Field of the Invention), of employing various taught options together (col. 18), and of teachings concerning in drive mechanism and movement (figure 1 & col. 7), these teachings may be considered to encompass forming a pattern of on a first portion made by the horizontal movement, then sequential plasma & drop deposition treatments, plus a pattern on the second portion made by the horizontal movement then sequential plasma & drop deposition treatments, as each change in direction may be considered a horizontal movement onto another portion to form another pattern, or even each incremental plasma treatment followed by drop deposition may be considered a different portion & different pattern, as would be consistent with the "a drop..." nomenclature in the present claims. Alternatively, it would've been obvious to employ such patterning designs with particular taught **plasma**, **corona** or **sputtering pretreatments** before inkjet droplet application, or to employ the process for

multiple successive pattern depositions on the substrate for producing desired pattern or patterns, due to the overall teachings in the patent, which are suggested for using the taught techniques for essentially any patterning that may be deposited via droplet techniques, so would suggest patterning employing multiple directions, or as application of multiple coatings by the liked techniques, etc., especially in the suggested uses for semiconductor industry, are typical & conventional practices, dependent on the specific product intended to be produced, such as multilayers for wiring configurations that are old and well-known as typical in the integrated circuit & semiconductor industry.

Also note that while the teaching that the various options may be used in combination can be considered to include the teachings of film forming on the surface insulating film, i.e. banks for containing the pattern depositions, as well as one of the various plasma pretreatments for the deposit, before the ink drop deposition occurs, Kiguchi et al. does not explicitly set forth this specific combination of steps. However, given the overall teachings & the teachings that combination of pretreatment steps can be employed, it would have alternately have been obvious to one of ordinary skill in the art to combine such teachings due to the suggestion of use of multiple options taught therein, as well as the reasonable expectation that improving the affinity due to plasma treatment, as well as an initial deposition of insulating bank material to hold the flow of droplet material (possibly re-treated to eliminate affinity or otherwise treated to insure its effectiveness) would have been expected to work in combination together provide a greater overall improvement together in resolution of the deposit due to the different means each technique employs to improve the resolution , which would have reasonably been expected to provide cumulative desirable effects.

Furthermore, some of the claims presently have relationships forming thin film depositions on the claimed insulating surfaces to have affinity relationships with the subsequently applied liquid composition, where aside from their liquid affinity or lack thereof, are merely a generic coatings that has been applied on a generic insulator (now encompassing any type of electrical insulator) before the plasma

treatment/liquid drop treatment is performed. Since substrates intended be treated by the process of Kiguchi et al. are not relegated to a single material or a single enduse, but the process is generally taught as useful to create patterns as needed (summary, e.g. col. 1, lines 33-44+; col. 2, lines 3-32, etc.), with treatments intended to be tailored dependent on affinities of substrate surface & deposition materials, where suggested enduses of the taught Related Art include used for patterning in the semiconductor industry, integrated circuit patterning & like, would reasonably suggest one of ordinary skill the art that the substrates been employed for the taught arbitrary patterning as needed by the arbitrary enduse would reasonably have encompassed substrates of composite materials, where one of ordinary skill the art would reasonably have expected the substrates to include insulating substrates like polymer or glass or the like, with any number of surface layers deposited thereon before the particular patterning technique was employed, dependent on whatever particular devices for which one is using the taught patterning techniques, hence one would consequently choose treatment for affinity or the opposite dependent on previous layer deposits of the preceding device formation sequence. The teachings of Kiguchi et al. provide a sufficiency of teachings that would reasonably enable one of ordinary skill and competence in the patterning art to choose their pretreatments in accordance with the particular properties of the last layer (or layers) exposed on the surface to be patterned & the related affinity properties of particular deposition fluid required for the next required pattern.

Kiguchi et al. does not discuss pressures employed in any of their processing techniques, however they also do not disclose the necessity or even mention the use of a chamber in which the overall process is performed, let alone one that requires a vacuum to be created, hence it would've been reasonable for one of ordinary skill in the art to assume that in general the processes as taught may be performed at atmospheric pressure, thus the tandem surface (plasma or corona) treatment, then ink drop deposition , which has taught would have to be performed at the same pressure would reasonably have been performed at atmospheric pressure, especially considering that unless stated otherwise, corona

discharge is usually performed at atmospheric pressure, or unless some particular characteristic of a particular treatment/deposition sequence required more stringent considerations (e.g. for contamination control &/or control of a particular technique, etc.). Also note that applicants' claimed range of 13 Pa-1.31 x 10^5 Pa ≈1-980 Torr is inclusive of atmospheric pressure.

With respect to the option of forming a groove or hole, as opposed to the also claimed option of roughening, while **Kiguchi et al**. teach use of plasma for surface modification in general, or for increasing or decreasing droplet affinity, & as generic means of changing the surface affinity, & inclusive of Ar sputtering (i.e. a type of etching, expected to at least roughen), with mentioned that pre-treatment processes before inkjet deposition may be employed to form banks to hold following ink jet deposition, Kiguchi et al. do not specifically suggest that a means of employing the plasma to increase the affinity or plasma treating when forming banks that includes etching deposited bank material in order to form a groove or hole to thus create the banks (i.e. just forming banks for preventing fluid from flowing out and around pattern forming areas on the substrate surface), however **Di Dio** (abstract; [0045-55], esp. [0053]; claims, esp. 1, 6, 10 & 16) teach a process of depositing hydrophobic material, then depositing a "deep UV" photoresist material thereon, patterning the photoresist material to expose the hydrophobic layer in the pattern, followed by etching of the exposed hydrophobic material, where that **etching may include plasma etching** (described as a traditional technique) to selectively remove hydrophobic material & expose underlying material. It would've been obvious to one of ordinary skill in the art to employ the patterning technique of Di Dio in forming the banks Kiguchi et al., as it provides an alternate bank formation techniques consistent with the processing techniques as disclosed in the primary reference, as well as showing the expected effectiveness of employing plasma for etching bank materials, as well as specifically noting that such etching procedures are traditional means of effecting such analogous patterning, which in combination with Kiguchi et al.'s teachings that employ plasma for treatment of the material of the banks, with suggested language relating to bank formation in connection with

pretreatments, would clearly suggest one of ordinary skill in the art that formation of the banks, i.e. patterning of the initially deposited material in order to form the banks, would reasonably have been expected to have been effectively performed by using pretreatment plasmas as suggested in Kiguchi et al. in the actual bank formation as taught by Di Dio.

Alternatively, **Okada et al**. ((470): figures 1-2, [0089-92]) also teach pattern formation using inkjet deposition, where alternative means of partition creation, plus means for increasing affinity of areas on which droplet deposition is desired, include dry etching plasma techniques for both steps; bus it would have been further obvious to employ plasma etching techniques as suggested by Okada et al. (470), for either or both formation of banks (i.e. partitions), an option suggested by Kiguchi et al. for perfecting droplet patterned deposition, or for effecting surface affinity another option suggested by Kiguchi et al. for perfecting droplet patterned deposition; since Okada et al. demonstrates the usefulness of such plasma treatments for analogous configurations, while Kiguchi et al. provide more generic plasma pretreatment & bank teachings, with the specific teachings of the desirability of performing these types of pretreatment steps in tandem nozzle configurations for pattern formation with inkjet deposition techniques.

While this combination does not teach the plasma for the etching comes from a nozzle, as discussed above the teachings of Kiguchi et al. are considered inclusive of application of the taught plasma or corona techniques via a nozzle, but optionally, **Lewis et al**. (979) may be further considered, as they clearly teach ablation from a plasma, where patterning is inclusive of their technique, hence the suggested plasma etching of the combination would have been expected to be effective when using a nozzle & would have been further obvious to accomplish with a plasma from a nozzle, for reasons as discussed above & as it has been demonstrated to provide patterning as desired by the combination.

As discussed in previous actions, **Lewis et al**. (979) employ plasma jet discharges in order to **ablate or otherwise transformed surface layers to change the affinity to subsequently applied coating**, such as printing ink or aqueous solutions, where such plasma techniques discussed in Lewis et

al., include the use of working gases such as N, Ar or another inert gas or oxidizing gases, such as oxygen; can be employed for effecting positive or negative affinity of substrates, including for wet coating techniques. In Lewis et al. (979 see the abstract; figures 3 & 4; col. 3, lines 46-55; col. 4, especially lines 1-12, & 40-61; col. 5, lines 25-41; col. 6, lines 55-col. 7, line 29; col. 9, lines 51-61; col. 10, lines 25-39; col. 14, lines 43- 54+; and col. 15, lines 33-68+). Therefore, it would have been reasonable to one of ordinary skill in the art that as Kiguchi et al. is providing teachings concerning plasmas that selectively affect the surface affinity to subsequent coating using plasmas suggesting output from nozzles, as well as bank formation, & Di Dio provide teachings and motivation to form analogous banks via plasma etching procedures applied to insulative films to remove material & thus formed the equivalent of banks in the form of grooves, but do not discuss particular plasma details to achieve the etching, that the process of Lewis et al. provide plasma techniques which would have been expected to be equivalently effective in the process of Kiguchi et al., as Lewis et al. demonstrates their techniques effectiveness for multiple different coatings inclusive of polymeric materials, metal materials, silicones, inks, etc., thus **showing** the expected general **effectiveness of such affinity & etching treatments via plasma from a nozzle**.

The examiner has previously noted that any localized pattern application via a nozzle will inherently provide a variation in plasma gas supplied in the plasma between the area(s) of localized application, and those areas surrounding it which are not being treated at that instant, which is relevant to the plasma application in any of the references of the above combination.

9. **Seki et al.** (EP 0989778 A1), as discussed in previous actions (section 5-6 of the action mailed 1/25/2008 & section 6 of the action mailed 11/7/2006) remains cumulative to the above rejections, as presenting specific plasma pre-treatments effective on specific materials before liquid applications that are relevant to the more general teachings of Kiguchi et al. (582).

10. **Claims 1, 3-4, 6 23-29 & 31-32** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Kiguchi et al. (**(582) or (231)), in view of **Di Dio** (2004/0152329 A1) or Okada et al. (470), plus **Speakman et al**. (6,849,308 B1), optionally considering **Lewis et al**. (5,272,979)), as applied to claims 2, 5, 16-17 & 30 above, and further in view of **Yamazaki et al.** (7,189,654 B2).

Independent claims 1, 23 & 26 require additional limitations in a more detailed process, which includes or encompasses the more general processes of independent claim 2, with variations on the initial film deposition on insulating or generic surface (which lacking any specific materials for succeeding steps has very little meaning). Specifically, these claims require that the patterns formed of generic material or conductive material, where it either this is consistent with Kiguchi et al.((582) or (231))'s teaching of employing metal salts or electric conductive materials in solution, however Kiguchi et al. does not specifically discuss that these materials that will create electrically conductive deposits or generic patterns or resist patterns, possibly employed for forming wiring patterns via forming a resist that is a mask pattern over a previous film or pattern, followed by some sort of an etching step to form a conductive pattern or a generic pattern, nor that the entire sequence of steps is repeated at least once. It has been further noted that claim 26 is analogous to claim 2 in that it includes the options that the plasma treatments to produce grooves or holes or roughness. The claims 31 & 32 were added to specify that the etching of a conductive material is via localize plasma discharge from a plurality of plasma discharge ports, which is related to the 9/21/10 amended configuration of an array of nozzles, however it is noted that such plasma patterning is already consistent with Kiguchi et al. in view of Di Dio & optionally Lewis et al., especially considering that Kiguchi et al. include teachings of post-treatment in combination with the pretreatment & depositing, where those treatments may include plasma, with references to plural nozzles (figures 18-19; col. 6, lines 35-67+) used in processing, thus while the specifically illustrated nozzles are for droplets, since the droplet depositions are performed in tandem with pre-&/or post-treatments (i.e. equivalent of integrated), plus the plasma treatments as discussed above are inclusive of

employing nozzles, this would reasonably have suggested to one of ordinary skill in the art that nozzle arrays would have been employed for plasma treatments also, either before or after droplet deposition, in order to derive taught benefits of pattern processing employing inkjet deposition techniques.

However with respect to specific use of patterning & etching configurations, **Yamazaki et al**. ((654): abstract; figures 3 & 4; claims, esp. 1-2, 5, 7, 10, 12, 15, 17, 19, 21 & 23) teach processes of further treating a deposited metal layer on a dielectric surface by selectively depositing in **masking material** thereon & **plasma etching** via a plasma device employing a **nozzle** in order to **selectively etch the periphery** of the conductive layer in order to form or prefect a wiring pattern, which is consistent with the new requirements for both patterning & localized plasma discharge, noting figure 4(B), described col. 11, lines 33-46 illustrates the required plural nozzles. Therefore, it would've been obvious to one of ordinary skill in the art that given Kiguchi et al. ((582) or (231)), especially in view of Di Dio et al. or Okada et al. (470), & optionally considering Lewis et al., as discussed above, which provides reasons why pretreatment is desirable, including plasma treatments (sputter etching to roughen, to etch partitions or banks, etc.), plus options of depositing conductive layers as claimed; hence to further treat such layers as taught by Yamazaki et al. (654), in order to perfect the conductive pattern layer for use as a wiring layer, as electrically conductive metal patterns are conventionally used as wiring layers, plus as the deposition & plasma treatments taught by Yamazaki are consistent with further treatment & deposition options as discussed by the above combination, especially considering the teachings therein that one may combine multiple options in order to produce the overall process, as well as considering that the taught related art relevant to the patterning processes of the primary reference suggested circuit patterns.

11. **Claims 1-6, 16-17, 23- 30 & 31-32** are rejected on the ground of nonstatutory **obviousness-type double patenting** as being unpatentable over claims 1-24 or claims 1-16 of U.S. Patent No. **7,189,654 B2** (Yamazaki et al.) or **7,625,493 B2** (Yamazaki), in view of **Kiguchi et al.** ((582) or

(231)), further in view of **Di Dio** (2004/0152329 A1) or **Okada et al**. (470), plus **Speakman et al**. (6,849,308 B1), optionally considering **Lewis et al**. (5,272,979), all references discussed above.

The claims of copending patented cases by overlapping inventors where with respect to copending **(654) patent** claims have been amended to have a new variation of overlapping subject matter. Copending (654) claims are depositing the initial conductive layers via a choice of techniques, i.e. CVD, evaporation or sputtering to produce a layer considered to read on a thin film, however the claims employ techniques effectively reading on claimed masking & etching procedures, which in the copending cases are specifically for perfecting the conductive deposition for use as a wiring configuration via use of a selectively deposited resist layer & etching, where the claims differ by not requiring the claimed plasma pretreatment before resist deposit or conductive patterning, via use of the claimed integrated nozzle pairs. However, given the teachings of Kiguchi et al. ((582) or (231)) as discussed above, it would've been obvious to one of ordinary skill in the art to use such integrated pretreatment & depositing means for depositing an electrically conductive pattern or resist patterns (e.g. masks), in order to aid in selective patterning deposits having enhanced affinity to create desired patterns, especially considering Kiguchi et al. teach such treatments may include plasma treatments, such as Ar sputtering, which would reasonably have been considered to encompass roughening, where plasma treatments or other treatments may be employed before &/or after droplet deposition, where those treatments employ plasma nozzle structures, thus noting that copending claims such as 5-6, 10-11, etc. which employee nozzle structures for plasma are consistent with Kiguchi et al. Also, note that as the technique of the initial deposition of the conductive pattern in copending (654) does not appear to be critical given the ability to depositing via multiple different techniques, additional or alternative deposition techniques used therewith would have been considered obvious variations.

With respect to the copending **(493) patent**, the claims therein are similar to those of (654), where the claims differ by not requiring a plasma pretreatment before deposition of variously claimed

generic or resist or conductive liquid droplets deposited via nozzles, thus not requiring the integrated droplet nozzle/plasma nozzle structure, nor the specific plasma treatment with respect to formation of grooves, holes or roughness, however as seen above with respect to Kiguchi et al. ((582) or (231)), both the integrated nozzle structure & the act of and desirability for pretreatment via plasma is known in the art, hence dependent on particular substrate confirmation & liquid affinities, it would've been obvious to one of ordinary skill in the art to employ the teachings of Kiguchi et al., in view of Di Dio or Okada et al. (470), plus Speakman et al., to determine appropriate & desirable plasma pretreatment techniques dependent on particular materials & configuration desired in a product, employing integrated plasma & drop delivery head structure, as discussed above.

12. **Other art** <u>of interest</u> with respect to plural plasma nozzle arrays includes **Nakamura** (7,824,520 B2) & JP 2002-343725 A by Kitahata Hironairi, which references are considered supportive of above obviousness of such plasma nozzle arrays, thus cumulative to the above rejections.

13. Applicant's arguments filed 9/21/10 & discussed above have been fully considered but they are not persuasive.

14. **Any inquiry** concerning this communication or earlier communications from the examiner should be directed to **Marianne L. Padgett** whose telephone number is **(571) 272-1425**. The examiner can normally be reached on M-F from about 9:00 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-

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/Marianne L. Padgett/
Primary Examiner, Art Unit 1715

MLP/dictation software

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